Utah Lake Water Quality Study: Science Panel Meeting #1





May 30, 2018

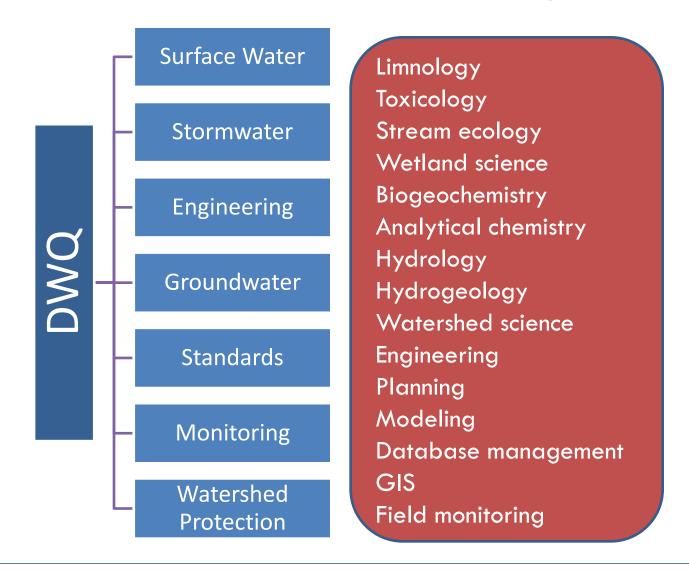
Division of Water Quality
Utah Department of Environmental Quality

Overview of Why We're Here: Setting the Context

Why does DWQ do what it does?



Division of Water Quality





Utah Water Quality Board

Mission

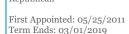
 Guide the development of water quality policy and regulation in the state.

Members

- Appointed by the governor (consent of senate).
- Makeup is defined by statute (Utah Code Section 19-5-103).
- Represent various interest groups of the water quality community

Myron E. Bateman, Chair

360 Kingston Drive Tooele, Utah 84074 Non-Federal Government Republican





Clyde L. Bunker

1670 N. Jones Road Delta, Utah 84624

Agriculture and Livestock Republican

First Appointed: 05/01/2011 Term Ends: 03/01/2019



Steven K. Earley

210 N. 400 E. Centerville, UT 84014

Non Government Organization Republican First Appointed: 5/20/2015 Term Ends: 3/01/2010



Gregg Alan Galecki

PO Box 203 Fairview, UT 84629

Mineral Industry Republican

First Appointed: 03/01/2013 Term Ends: 06/21/2021



Jennifer M. Grant

4700 Daybreak Parkway South Jordan, UT 84095

Manufacturing Industry Independent

First Appointed: 03/01/2013 Term Ends: 06/21/2021



Michael Luers

2800 Homestead Road Park City, UT 84098 Special Service Dist. Independent

First Appointed: 5/20/2015 Term Ends: 3/01/2019



Alan Matheson

Department of Environmental Quality 195 North 1950 West P.O. Box 144810 Salt Lake City, UT 84114-4810

Executive Director
Department of
Environmental Quality
Independent

David C. Ogden

75 East Center Street Richfield Ut. 84701 Non-Federal Government

First Appointed: 8/23/2017 Term Ends: 8/31/2021



Jim VanDerslice, PhD

375 University of Utah Salt Lake City, UT 84108 Non-Federal Government Independent

First Appointed: 03/01/2016 Term Ends: 06/21/2021

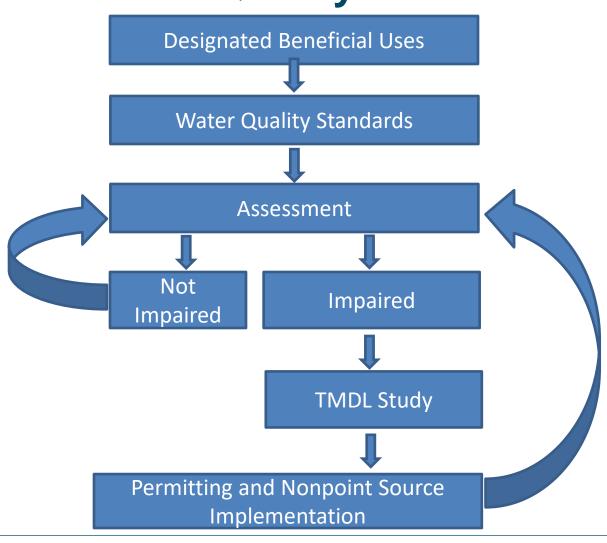




Utah's Regulatory Authority to Protect and Restore Water Quality

Clean Water Act Sections 303, 304, 305, and 402 (among others) → Delegated from EPA to State of Utah, DEQ

Utah Water Quality Act
(Title 19-5) outlines
Powers of Water Quality
Board and Director of
Division of Water Quality





Statewide Uses Designations (R317-6)

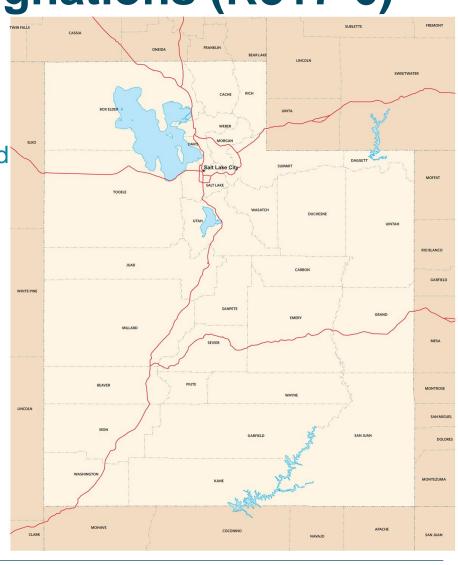
Class 1 -- Protected for use as a raw water source for domestic water systems

Class 2 -- Protected for recreational use and aesthetics.

Class 3 -- Protected for use by aquatic wildlife.

Class 4 -- Protected for agricultural uses including irrigation of crops and stock watering.

Class 5 -- The Great Salt Lake.





Application of Standards (R317-2-7.1)

The numeric criteria listed in R317-2-14 shall apply to each of the classes assigned to waters of the State as specified in R317-2-6.



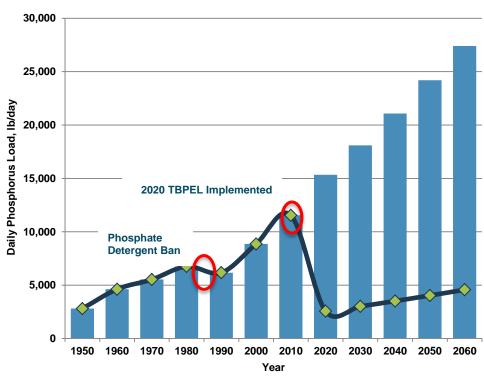
Narrative Standards R317-2-7.2

"It shall be unlawful, and a violation of these rules, for any person to discharge or place any waste or other substance in such a way as will be or may become offensive such as unnatural deposits, floating debris, oil, scum or other nuisances such as color, odor or taste; or cause conditions which produce undesirable aquatic life or which produce objectionable tastes in edible aquatic organisms; or result in concentrations or combinations of substances which produce undesirable physiological responses in desirable resident fish, or other desirable aquatic life, or undesirable human health effects, as determined by bioassay or other tests performed in accordance with standard procedures; or determined by biological assessments in Subsection R317-2-7.3."



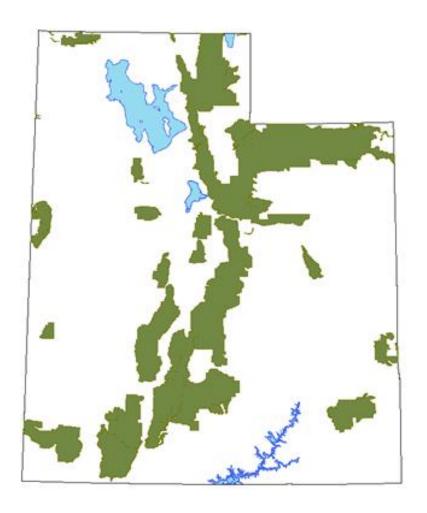
"Hold the Line" state-wide on nutrients with Technology Based Phosphorus Effluent Limit of 1 mg/L by 1/1/2020

Utah Phosphorus Loading to State



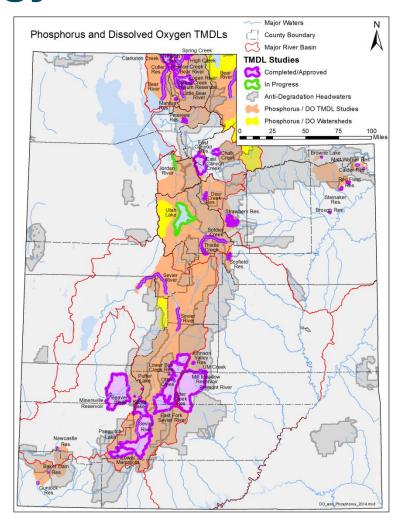


Headwater Numeric Nutrient Criteria to protect pristine waters





Develop site-specific nutrient standards for major waters





Continue nonpoint source project implementation

UTAH STATEWIDE NONPOINT SOURCE POLLUTION MANAGEMENT PLAN





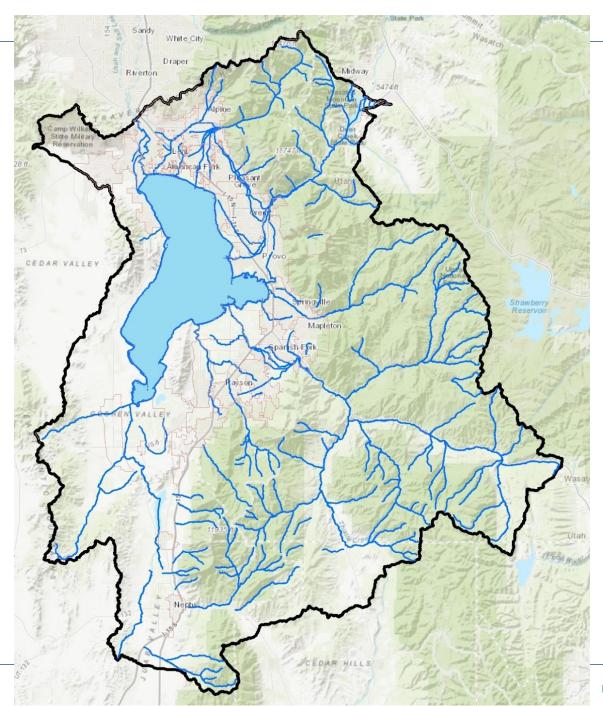


Prepared by the Utah Department of Environmental Quality in Cooperation with the UTAH WATER QUALITY TASK FORCE



...In the Context of Utah Lake







Utah Lake Designated Beneficial Uses

2B: Protected for infrequent primary contact recreation.

3B: Protected for warm water species of game fish and other warm water aquatic life, including the necessary aquatic organisms in their food chain.

3D: Protected for waterfowl, shore birds and other water-oriented wildlife, including the necessary aquatic organisms in their food chain.

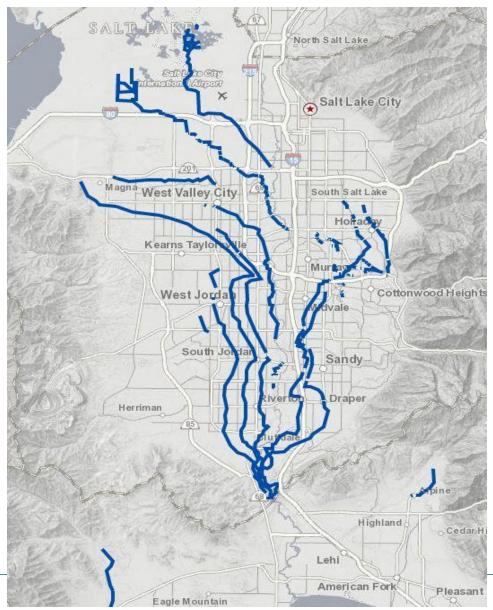
4: Protected for agricultural uses including irrigation of crops and stock watering.

Utah Lake is NOT designated as Class 1C (Source of domestic drinking water)





Downstream Water Use





Utah Lake Water Quality Timeline

2002 303(d) Impairments (TP)

- 2004-2008 TMDL Initiative
 - Loading Estimates for WWTP, tribs, and misc. sources

2008 Utah Statewide Nutrient Strategy

- TBPEL 2015
- Headwater criteria in progress
- Site specific investigation for high priority waters

Utah Lake Harmful Algal Blooms (HABs)

- 2014 HAB near Lindon Marina
- 2015/2016 HAB Guidance Document



Utah Lake Water Quality Timeline

2016 303(d) Impairments

- Harmful Algal Blooms
- pH Provo Bay
- Ammonia Provo Bay

Utah Lake Water Quality Study

- Initiated in November 2015
 - Phase 1 work plan elements
- November 2016 Initiated Stakeholder Process development



Utah Lake Impairment Listings

Year Listed	Water Body	Parameter	Use Impaired
2002	Utah Lake	Total Dissolved Solids	4 – Agricultural
2002	Utah Lake	Total Phosphorus	3B - Aquatic Life
2010	Utah Lake	PCBs	3B - Aquatic Life
2016	Utah Lake	Harmful algal bloom	2B - Recreational
2016	Provo Bay	Ammonia	3B – Aquatic Life
2016	Provo Bay	рН	3B – Aquatic Life

Utah Lake Uses

2B: Protected for infrequent primary contact recreation.

3B: Protected for warm water species of game fish and other warm water aquatic life, including the necessary aquatic organisms in their food chain.

3D: Protected for waterfowl, shore birds and other water-oriented wildlife, including the necessary aquatic organisms in their food chain.

4: Protected for agricultural uses including irrigation of crops and stock watering.



Utah Lake Water Quality Study Phase I



Utah Lake Water Quality Study

Purpose

- Evaluate the role of excess nutrients on designated use impairments
- Identify appropriate in-lake nutrient endpoints

Driving Factors

- Nutrient related 303(d) impairments
- Continuation of previous studies
- Recent HAB events
- Regulatory certainty

Funding

\$1 million from Water Quality Board

Implementation

- Discharge permits after January 1, 2030
- Utah Nonpoint Source Program





Phase 1 Work Elements

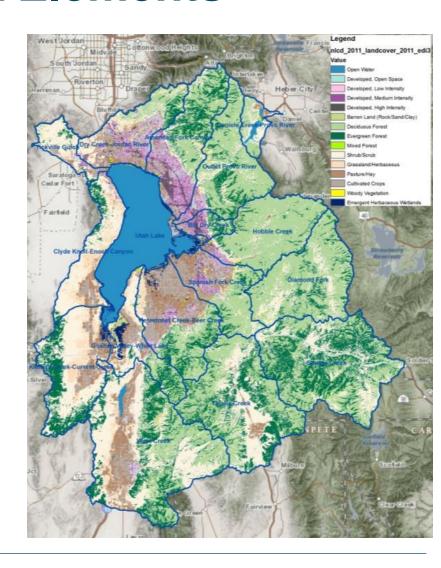
Task 1 – Stakeholder Development

Task 2 – Data and information management

Task 3 – Designated Use Assessment

Task 4 – Source and nutrient load analysis

Task 5 – Model Selection and Development





Utah Lake Stakeholder Involvement

Utah Lake Water Quality Stakeholder Group

- Tiered from Utah Lake Commission TAC
- 100+ representatives:
 - Local municipalities and Utilities
 - POTWs
 - Local Universities
 - Private Consulting
 - Advocacy Groups
 - State, local and federal government

Water Quality Subgroups

- Data and Information Management (Task 2)
- Beneficial Use Assessment (Task 3)
- Load Analysis (Task 4)
- Model Selection and Development (Task 5)



Project Status: Data and information management (Task 2)

Coordination of monitoring activities

- DWQ Monitoring Activities
- Partner monitoring/research

Data compilation and database development

- Share data
- Populate Database
- Circulate Database

Literature Review and synthesis



Beneficial Use Assessment (Task 3)

Beneficial use assessment

Update Integrated Report with recent data as appropriate

Baseline data characterization

- Data completeness
- Analysis of trophic related parameters
- Data gap analysis



Source and Nutrient Load Analysis (Task 4)

Water budget

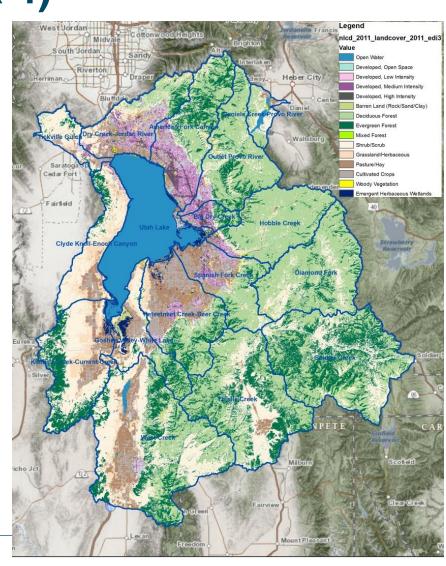
Bulk load analysis

Refine load estimates

- Spring and storm runoff
- Dry weather and base flow
- Seasonal distribution
- Nonpoint source loading

Metadata Characterization

- Watershed loading data evaluation
- Source identification/characterization
- Water budget evaluation
- Monitoring strategy





Model Selection and Development (Task 5)

Model Selection Process

- Stakeholder subgroup
- Evaluate model options

Model Selection

Model selection report

Model Development

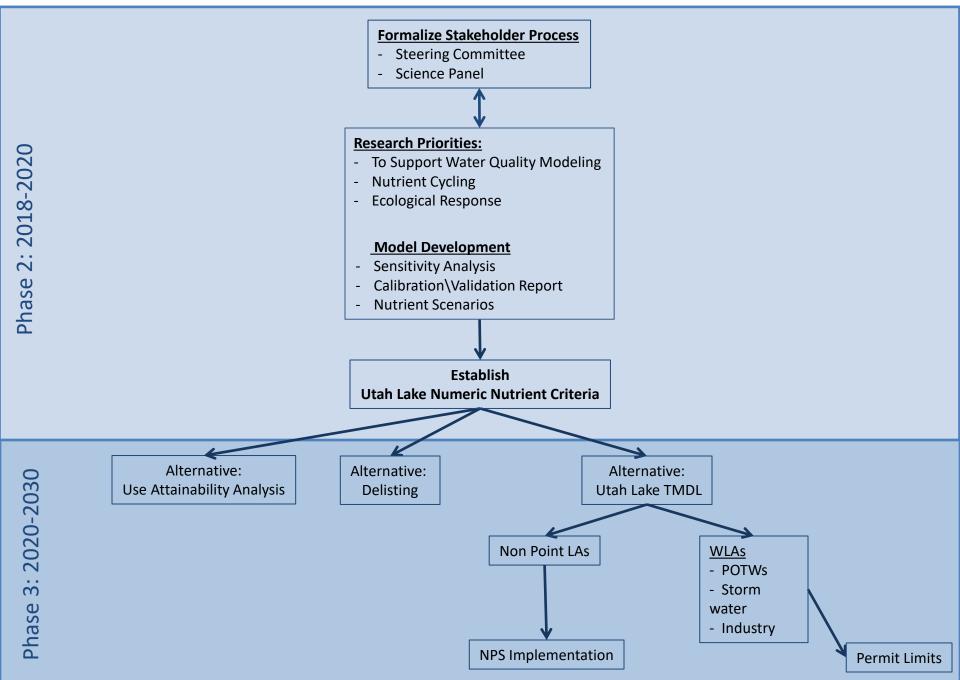
University of Utah

Model Name	WASP	CAEDYM	PCLAKE	CE-QUAL- W2
Spatial Dimension	1D-H	1D-V	0D	2D-V
Stratification	-	+	-	+
Inorganic Sediment Groups	3	2	1	>3
Littoral Zone	-	+	+	-
Phytoplankton Groups	3	7	3	>3
Zooplankton Groups	1	5	1	>3
Benthic Algae Groups	1	4	1	>3
Macrophyte Groups	+	1	1	>3
Macroinvertebrate Groups	0	3	1	0
Fish Groups	0	3	3	0
Bird Groups	0	0	0	0
Hydrodynamics	+	+	±	+
Temperature Dynamics	+	+	+	+
Oxygen Dynamics	+	+	+	+
Inorganic Carbon (CO2/DIC) Dynamics	+	+	-	+
Organic Carbon (DOC/POC) Dynamics	+	+	+	+
Microbial Dynamics	+	+	±	+
Internal Phosphorus Dynamics	+	+	+	+
Phosphorus Sorption to Sediment	±	+	±	±
Internal Nitrogen Dynamics	+	+	+	+
Internal Silica Dynamics	+	+	±	+
Sedimentation/Resuspension	±	+	±	±
Sediment Diagenesis	+	+	±	+
Fisheries Management	-	±	+	-
Dredging	-	-	+	-
Mowing	-	-	+	-
Ice Cover	+	-	-	+
Clear-Turbid State Transition	-	±	+	±



Introduction to ULWQS Phase II (and III)





Preliminary Study Questions

Nutrient Dynamics

- How are nutrients linked to algal blooms, dissolved oxygen, ammonia, and other water quality concerns in Utah Lake?
- What are the roles of internal lake processes, weather, and water management on nutrient cycling and algal blooms?

Loading Characteristics

- What is the origin, timing, and magnitude of nutrient loading to Utah Lake?
- How do nutrient loads to Utah Lake translate into downstream effects in the Jordan River and Great Salt Lake?

Recreation Use Survey

What is the desired condition for recreational users?

Costs and Benefits

- How much will it cost for Utah County communities to reduce nutrients from wastewater, stormwater, and agricultural runoff?
- What are the economic and social costs of Harmful Algal Blooms?
- What are the benefits of improved water quality in Utah Lake to the fishery, recreational users, water users, and community development?



Overview of ULWQS Stakeholder Process



Stakeholder Process

Stakeholder Group

- Utah Lake Commission Technical Committee
- 100+ representatives:
 - Local municipalities, POTWs, universities, consultants, advocacy groups, water users, recreationists, government.
- Water quality subgroups for technical direction

Challenges

- Very large committee
- Stakeholders Under or unfairly represented
- Lack of common understanding of goals/endpoints
- Conflict resolution
- Limited/ineffective collaboration
- Consensus-based decision making





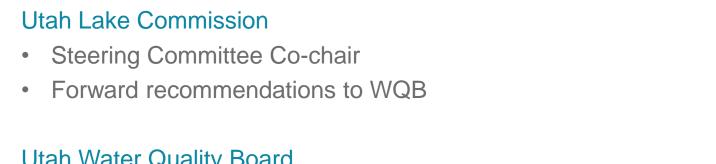


Division of Water Quality

- Steering Committee Co-chair
- Provide for meeting facilitation
- Staff administrative & technical support
- Approval of Steering Committee and Science Panel charters
- Facilitate recommendations to WQB

Utah Water Quality Board

- Consider recommendations from Steering Committee, ULC, and DWQ
- Adopt water quality criteria

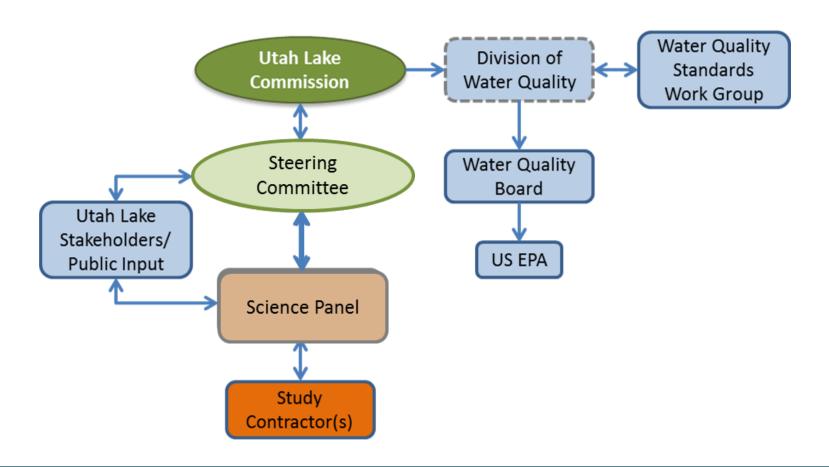




Stakeholder

Structure

Process Structure





Steering Committee Membership

Stakeholder Interest	Affiliation	Representative	Alternate
Utah Lake Commission (Co-chair)	Utah Lake Commission Executive Director	Eric Ellis	Sam Braegger
Water quality	Utah Div. of Water Quality	Erica Gaddis	Jim Harris
Recreation, fishing, and sovereign lands	Utah Department of Natural Resources	Chris Keleher	Laura Ault
Agriculture/ water rights/ water users	Utah Lake Water Users Association	Jesse Stewart	Jon Hilbert
Fish and wildlife	U.S. Fish and Wildlife Service	George Weekley	Chris Cline
Agriculture	Utah Conservation Commission Zone,3, Utah Department of Agriculture and Food, or local agricultural interest	Jay Olsen (UDAF)	Daniel Gunnel (UDAF/Conservation Commission Zone 3)
Public health	Utah County Health Department	Jason Garrett	Craig Bostock
Recreation	Recreational club, anglers, hunters, or business	Garrett Smith (Utah Lake Water Ski Association)	Todd Fry (Bonneville Sailing Club)
Conservation and environment	Environment or conservation organization	Heidi Hoven (Audubon Society)	Ella Sorensen (Audubon Society)
Water management of Utah Lake	Central Utah Water Conservancy District or appropriate water manager	Gerard Yates (CUWCD)	Mike Rau (CUWCD)
Stormwater	Utah County	Jay Montgomery (Utah County Stormwater Association)	Travis Taylor (Utah County)
Publically Owned Treatment Works	Municipal or district	David Barlow (Timp. SSD)	David Land (Timp. SSD)
Municipal	City Mayor or designee	Gary Calder (Provo City)	Cory Pierce (Spanish Fork City)
Municipal	City Mayor or designee	Brad Stapley (Springville City)	Juan Garrido (Springville City)
Municipal	City Mayor or designee	Neal Winterton (City of Orem)	Dave Norman Lehi City)
Academia	University researcher	Dennis Shiozawa (BYU)	Nancy Mesner (USU)

Steering Committee

Purpose: Guide development of in-lake water quality criteria that are protective of designated uses and sustain natural resources of Utah Lake

Objectives/Duties

- Partnerships among stakeholders
 - Consensus based approach
 - Promote collaboration among stakeholders
 - Access to scientific and policy expertise
 - Coordinate funding sources
- Establish science panel



Steering Committee

Purpose: Guide development of in-lake water quality criteria that are protective of designated uses and sustain natural resources of Utah Lake

Objectives/Duties

- Develop goals and objectives
- Acknowledge uncertainty
- Recommendation to Commission and WQB



Stakeholder Facilitation

Situation Assessment

- Assess stakeholder dynamics
- Build trust among stakeholders
- Identify critical issues and challenges
- Opportunities for mutual gain
- Identify potential obstacles

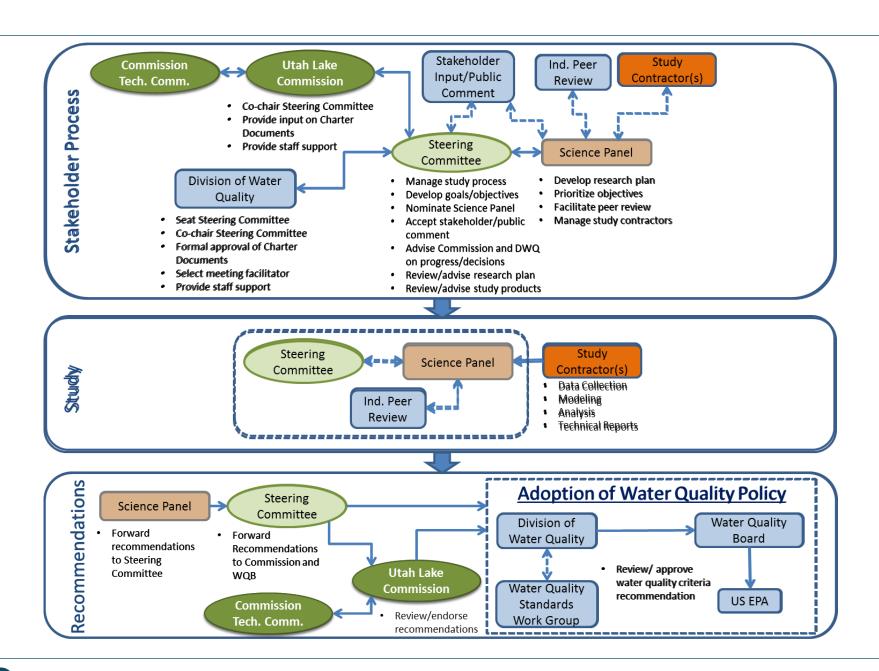
Meeting Facilitation

- Steering Committee
- Science Panel
- Science Panel/contractor interactions

Stakeholder Facilitation

- Coordination of internal and external stakeholders
- Public engagement







Objectives and Duties of the Science Panel



Science Panel

Purpose:

Guide water quality criteria development by overseeing targeted scientific study

Objectives/Duties

- Develop scientifically defensible approach
- Identify gaps in scientific expertise and understanding
- Recommend study objectives to Steering Committee
- Develop strategic research program
- Develop process for independent peer review
- Develop guidance for treatment of uncertainty
- Recommend water quality criteria to Steering Committee



Science Panel

Objectives/Duties

- Recommend and prioritize studies
- Develop study methods
- Guide Scientific research
 - Define study objectives
 - Review and approve study work plans
 - Direct Pl's and study contractors
 - Review and participate in data collection efforts
 - Interpret and report results
- Collaborate with related research programs



Science Panel Membership

						D. I	-11							
				Related Expertise										
	Representative	Affiliation	Primary Discipline	Aquatic ecology	Biogeochemistry	Fisheries management	Hydrodynamic	Nutrient cycling	-imnology	Phycology	oxicology	Nater quality criteria	Water quality modeling	Wetland science
Independent (Voting)	Michael Brett	University of Washington	Limnology		_	_			X		•			
	Mitch Hogsett	Forsgren Associates	Biogeochemistry		Χ									
	Ryan King	Baylor University	Aquatic ecology	Χ	Χ			Χ	Χ				Χ	Χ
	James Martin	Mississippi State University	Water quality modeling	X	X		X	X				X	X	
	Hans Paerl	University of North Carolina	Limnology	X	X			Χ	X	X				
<u></u>	Janice Brahney	Utah State University	Biogeochemistry		Χ									
ting	Soren Brothers	Utah State University	Limnology						Χ					
κ Officio (Non-Voting)	Greg Carling	Brigham Young University	Biogeochemistry		X			X						
	Jereme Gaeta	Utah State University	Aquatic ecology	Χ		Χ								
	Theron Miller	Wasatch Front Water Quality Council	Biogeochemistry	X	X	Χ	X	X	X		X	X	X	Χ
Ä	Sam Rushforth	Rushforth Phycology	Phycology	Χ					Χ	Χ				

Discussion

utahlake.deq.utah.gov





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